Discharge measurements for seepage run of June 16, 2004, Waihee River, Maui, Hawaii
[cfs, cubic feet per second]

Site no.	USGS site ID	Station name	Time	Discharge, in cfs	Remarks
1	205610156324702	Waihee Riv at Waihee Ditch intake left, Maui, HI	13:03-13:23	0.16	
2	205610156324701	Waihee Riv at Waihee Ditch intake right, Maui, HI	12:21-12:48	0.36	
3	205613156323901	Unnamed Trib to Waihee Riv at Waihee Dt DS Maui HI	14:11-14:21	0.12	All diverted
4	205627156323401	Huluhulupueo Stream at Waihee River, Maui, HI	11:12-11:47	0.60	
5	16615000	Spreckels Ditch near Waihee	10:50-11:18	2.17	
6	205633156321901	Spreckels Ditch overflow to Waihee River, Maui, HI	11:39-11:51	0.10	Flow under sluice gate
7	205634156314201	Waihee River upstream of Field 1 intake, Maui, HI	13:04	0.01e	
8	205634156313801	Waihee Riv downstream of Field 1 intake, Maui, HI	13:28	0.04e	Mostly leakage from diversion
9	205651156303901	Waihee River near mouth, Maui, HI	15:07-15:29	1.41	
	16614000	Waihee River at Dam near Waihee, Maui, Hawaii		56	Daily mean

e estimated

Discharge measurements for seepage run of September 21, 2004, Iao Stream, Maui, Hawaii
[cfs, cubic feet per second]

Site no.	USGS site ID	Station name	Time	Discharge, in cfs	Remarks
	16604500	Iao Stream at Kepaniwai Park nr Wailuku, Maui, HI		13	Daily mean
1	205257156322001	Iao Stream DS of Maniania Ditch, Maui, HI	8:55-9:15	0.08e	Leakage through diversion
2	205300156321401	Maniania Ditch leakage to Iao Stream, Maui, HI	9:30-9:40	0.01	Estimate
3	205257156321002	Trib to Iao Stream at Kepaniwai Park, Maui, HI	9:45-9:55	0.17	
4	205257156321001	Iao Stream at Kepaniwai Park, Maui, HI	10:05-10:19	0.48	
5	205303156315201	Duey diversion from Iao Stream, Maui, HI	11:25-11:30	0.14	PVC pipe flow from stream
6	205303156315101	Iao Stream downstream of Duey diversion, Maui, HI	11:56-12:11	0.29	Duey diversion off, all flow in stream
7	205303156314001	Duey return at Iao Stream, Maui, HI	13:55	0.03	Not representative, diversion off
7a	205303156314001	Duey return at Iao Stream, Maui, HI	13:00	0.07	9/22/04; diversion working
8	205303156314002	Iao Stream downstream of Duey return, Maui, HI	14:50-15:04	0.32	
9	205301156310501	Iao Stream at Kama Ditch intake, Maui, HI	15:30	0.00	
10	205312156304701	Spring at Iao Stream debris basin wall, Maui, HI	16:18-16:33	0.48	
11	16607000	Iao Stream at Wailuku, Maui, HI	16:58-17:12	0.76	

e estimate

Discharge measurements for seepage run of October 28, 2004, Waikapu Stream, Maui, Hawaii
[cfs, cubic feet per second]

Site no.	USGS site ID	Station name	Time	Discharge, in cfs	Remarks
1	205121156320901	Waikapu Str, South Waikapu Ditch intake, Maui, HI	12:35-13:00	2.79	Diversion from stream
2	205122156320901	Waikapu Str DS of South Waikapu Ditch, Maui, HI	11:41-12:05	0.78	
3	205122156320601	Waikapu Str, South Waikapu Dt overflow, Maui, HI	13:45	0.07e	Leakage from tunnel
4	205125156320101	Waikapu Str US Unnamed Trib at 1060 ft, Maui, HI	14:50-15:00	0.62	About 0.16 loss from site 2 to here
5	205122156320101	Unnamed Trib to Waikapu Str at 1060 ft, Maui, HI	14:08-14:29	2.27	
6	16650000	Waikapu Stream near Waikapu	15:35-15:57	3.11	Old gage site, 0.22[m] gain from site 4+5
7	205125156304801	Waikapu Str US of left bank taro intake, Maui, HI	12:00-12:30	2.92	0.19[m] loss from site 6
8	205124156304401	Waikapu Str, left bank taro diversion, Maui, HI	13:10-13:27	1.02	Diversion from stream
9	205123156304201	Waikapu Str, left bank taro div overflow, Maui, HI	14:06-15:20	0.46	Return flow to stream
10	205121156304001	Waikapu Str, left bank taro return, Maui, HI	10:08-10:27	0.19	Return flow to stream
11	205118156302901	Waikapu Str, right bank inflow, Maui, HI	15:31-15:40	0.20	No gain or loss in stream from site 7
12	205116156302601	Waikapu Str US of Waihee Ditch intake, Maui, HI	16:02-16:28	2.77	0.02[m] gain from site 7
13	205114156302301	Waikapu Str DS of Waihee Ditch, Maui, HI	17:11-17:27	0.60	2.17 diverted by Waihee Ditch
14	205112156301601	Waikapu Str US of Reservoir 6 intake, Maui, HI	16:50-17:05	1.10	Water returned from Waihee Ditch, all diverted to Reservoir 6, Dry ds of intake to coast
15	205024156292301	Waikapu Stream at Route 380 bridge, Maui, HI	17:30	0.00	Dry

Discharge measurements for seepage run of August 18, 2005, Makamakaole Stream, Maui, Hawaii
[cfs, cubic feet per second]

Site no.	USGS site ID	Station name	Time	Discharge, in cfs	Remarks
1	205717156323101	Makamakaole Stream at 940 ft, Maui, HI	11:09-11:33	1.71	
2	205717156323201	Makamakaole Str rt bank inflow at 940 ft, Maui, HI	10:06-10:20	0.11	
3	205732156320001	Makamakaole Stream at 670 ft, Maui, HI	12:43-13:00	1.35	Loss of about 0.47 cfs
4	205751156313401	Makamakaole Stream near mouth, Maui, HI	10:08-10:18	0.63	Poor section; 10% leakage; loss of about 0.72 cfs

Discharge measurements for seepage run of August 17, 2005, Waiehu Stream, Maui, Hawaii [cfs, cubic feet per second]

Site no.	USGS site ID	Station name	Time	Discharge, in cfs	Remarks
1	205435156315201	N Waiehu Str US of N Waiehu Ditch intake, Maui, HI	10:54-11:22	3.29	6ft. downstream, boulder in the middle of the stream.
2	205435156315001	Waiehu Ditch intake, North Waiehu Stream, Maui, HI	11:48-12:04	3.00	Two small leakages along ditch.
3	205432156312701	N Waiehu Str US of Waihee Ditch flume, Maui, HI	09:00	0.00	Dry; lost 0.29 cfs
4	205433156310101	N Waiehu Stream at Malaihi Road, Maui, HI	12:00	0.00	Dry
5	205449156302801	N Waiehu Stream upstream of fork, Maui, HI	15:02-15:23	0.28	Gain from Spreckels Ditch
6	205420156311301	S Waiehu Str DS of Waihee Ditch flume, Maui, HI	11:24-11:47	3.20	
7	205439156303401	S Waiehu Str US of Spreckels Dt intake, Maui, HI	15:00-15:35	3.67	Gain of 0.47 cfs
8	205448156302801	S Waiehu Stream upstream of fork, Maui, HI	16:27-16:30	0.02	
9	205504156295101	Waiehu Stream at Kahekili Highway, Maui, HI	16:57-17:02	0.46	Right and left tunnel; gain of 0.19 cfs
10	205506156293501	Waiehu Stream near mouth, Maui, HI	16:19-16:56	0.19	Reworked section. G.H. rose after finished; loss of 0.27 cfs

Punaluu Stream seepage investigation of September 10, 2004.
[cfs, cubic feet per second]

A series of discharge measurements were made on September 10, 2004, on Punaluu Stream, Oahu, Hawaii, to study channel gains and losses. The reach extends from a channel altitude of about 10 feet above mean sea level to about 60 feet above mean sea level. The discharge measurements were made during a period of near constant base flow in the stream; during the 7-day period prior to the seepage run, only 0.25 inches of rain fell at a National Weather Service rain gage.

Site no.	USGS site ID	Station name	Discharge, in cfs	[a]Channel gain or loss, in cfs
1	213356157534601	Punaluu Stream at altitude 60 feet, Oahu, HI	17.5	--
2	213357157534001	Punaluu Stream at altitude 50 feet, Oahu, HI	17.7	+0.2 (17.7 – 17.5)[b]
3	213402157533701	Punaluu Stream at altitude 35 feet, Oahu, HI	17.4	-0.3 (17.4 – 17.7)
4	213405157533801	Ditch return flow to Punaluu Stream, Oahu, HI	4.03	--
5	213409157533901	Punaluu Stream at altitude 25 feet, Oahu, HI	21.6	+0.17 (21.6 – 4.03 – 17.4)
6	213415157533401	Trib to Punaluu Stream at altitude 20 ft, Oahu, HI	0	--
7	213413157533101	Lower taro discharge pipe, Punaluu, Oahu, HI	0.09	--
8	213413157532801	Upper taro discharge pipe, Punaluu, Oahu, HI	0.13	--
9	213416157532401	Tributary to Punaluu Stream at alt 15 ft, Oahu, HI	<0.01	--
10	213425157531701	Punaluu Stream at altitude 10 feet, Oahu, HI	22.6	+0.78 (22.6 – 0.13 – 0.09 – 21.6)

[a]Channel gain or loss between stream locations excludes measured return flows to the stream.
[b]This gain of 0.2 cfs likely represents unmeasured return flow from nearby aquaculture ponds above the left bank of the stream.

Punaluu Stream seepage investigation of September 24, 2004.
[cfs, cubic feet per second]

A series of discharge measurements were made on September 24, 2004, on Punaluu Stream, Oahu, Hawaii, to study channel gains and losses. The reach extends from a channel altitude of about 60 feet above mean sea level to about 165 feet above mean sea level. The discharge measurements were made during a period of near constant base flow in the stream; during the 7-day period prior to the seepage run, about 0.48 inches of rain fell at a nearby National Weather Service rain gage.

Site no.	USGS site ID	Station name	Discharge, in cfs	[a]Channel gain or loss, in cfs
0.5	16303000	Punaluu Stream near Punaluu	14.8	--
1	site file to be created	Punaluu Stream at altitude 165 feet, Oahu, HI	16.6	+1.8[b]
2	site file to be created	Trib to Punaluu Stream near alt 150 feet, Oahu, HI	0	--
3	213332157535601	Punaluu Stream at altitude 140 feet, Oahu, HI	15.2	-1.4
4	213333157540001	Trib to Punaluu Stream near alt 135 feet, Oahu, HI	1.38	--
5	213336157535901	Trib to Punaluu Stream near alt 125 feet, Oahu, HI	0.12	--
6	213344157535301	Punaluu Stream at altitude 100 feet, Oahu, HI	19.9	+3.2
7	213346157535501	Trib to Punaluu Stream near alt 95 feet, Oahu, HI	0.03	--
8	213348157534901	Trib to Punaluu Stream near alt 75 feet, Oahu, HI	0	--
9	213352157534601	Trib to Punaluu Stream near alt 70 feet, Oahu, HI	0.69	--
10	213355157534701	Trib to Punaluu Stream near alt 65 feet, Oahu, HI	0	--
11	213356157534701	Trib to Punaluu Stream near alt 60 feet, Oahu, HI	0	--
12	213356157534601	Punaluu Stream at altitude 60 feet, Oahu, HI	18.7	-1.92

[a]Channel gain or loss between stream locations excludes measured tributary inflows to the stream.
[b]Gain may be partly attributed to an unmeasured right-bank tributary inflow about 300 feet downstream from USGS gaging station 16303000.

Punaluu Stream seepage investigation of October 1, 2004.
[cfs, cubic feet per second]

A series of discharge measurements were made on October 1, 2004, on Punaluu Stream, Oahu, Hawaii, to study channel gains and losses. The reach extends from a channel altitude of about 60 feet above mean sea level to about 210 feet above mean sea level. The discharge measurements were made during a period of near constant base flow in the stream; during the 7-day period prior to the seepage run, about 0.98 inches of rain fell at a nearby National Weather Service rain gage.

Site no.	USGS site ID	Station name	Discharge, in cfs	[a]Channel gain or loss, in cfs
0.5	16303000	Punaluu Stream near Punaluu	9.72	--
3	213332157535601	Punaluu Stream at altitude 140 feet, Oahu, HI	11.4	+1.68[b]
4	213333157540001	Trib to Punaluu Stream near alt 135 feet, Oahu, HI	1.33	--
5	213336157535901	Trib to Punaluu Stream near alt 125 feet, Oahu, HI	0.11	--
6	213344157535301	Punaluu Stream at altitude 100 feet, Oahu, HI	11.7	-1.14
7	213346157535501	Trib to Punaluu Stream near alt 95 feet, Oahu, HI	0.03	--
8	213348157534901	Trib to Punaluu Stream near alt 75 feet, Oahu, HI	0	--
9	213352157534601	Trib to Punaluu Stream near alt 70 feet, Oahu, HI	0.72	--
10	213355157534701	Trib to Punaluu Stream near alt 65 feet, Oahu, HI	0	--
11	213356157534701	Trib to Punaluu Stream near alt 60 feet, Oahu, HI	0	--
12	213356157534601	Punaluu Stream at altitude 60 feet, Oahu, HI	13.8	+1.35

[a]Channel gain or loss between stream locations excludes measured tributary inflows to the stream. Indicated channel gain or loss may have been affected by decreases in the magnitude of streamflow diversion into the Punaluu Ditch near USGS gaging station 16303000.
[b]Gain may be partly attributed to two unmeasured right-bank tributary inflows, one about 300 feet downstream and another about 1,500 feet downstream from USGS gaging station 16303000.

Punaluu Stream seepage investigation of June 9, 2005.
[cfs, cubic feet per second]

A series of discharge measurements were made on June 9, 2005, on Punaluu Stream, Oahu, Hawaii, to study channel gains and losses. The reach extends from a channel altitude of about 5 feet above mean sea level to about 210 feet above mean sea level. The discharge measurements were made during a period of near constant base flow in the stream; during the 7-day period prior to the seepage run, about 0.98 inches of rain fell at a nearby National Weather Service rain gage.

Site no.	USGS site ID	Station name	Discharge, in cfs	[a]Channel gain or loss, in cfs
0.5	16303000	Punaluu Stream near Punaluu	12	--
3	213332157535601	Punaluu Stream at altitude 140 feet, Oahu, HI	11.9	-0.1 (11.9 – 12)[b]
4	213333157540001	Trib to Punaluu Stream near alt 135 feet, Oahu, HI	1.11	--
5	213336157535901	Trib to Punaluu Stream near alt 125 feet, Oahu, HI	0.12	--
6	213344157535301	Punaluu Stream at altitude 100 feet, Oahu, HI	12.1	-1.03 (12.1 – 0.12 -- 1.11 – 11.9)
7	213346157535501	Trib to Punaluu Stream near alt 95 feet, Oahu, HI	0.018	--
8	213348157534901	Trib to Punaluu Stream near alt 75 feet, Oahu, HI	0	--
9	213352157534601	Trib to Punaluu Stream near alt 70 feet, Oahu, HI	0.022	--
10	213355157534701	Trib to Punaluu Stream near alt 65 feet, Oahu, HI	0	--
11	213356157534701	Trib to Punaluu Stream near alt 60 feet, Oahu, HI	0.33	--
12	213356157534601	Punaluu Stream at altitude 60 feet, Oahu, HI	12.5	+0.03 (12.5 – 0.33 – 0.022 – 0.018 – 12.1)
13	213402157533701	Punaluu Stream at altitude 35 feet, Oahu, HI	12.4	-0.1 (12.4 – 12.5)[c]
14	213405157533801	Ditch return flow to Punaluu Stream, Oahu, HI	0.95	--
15	213413157533101	Lower taro discharge pipe, Punaluu, Oahu, HI	0.60	--
16	213413157532801	Upper taro discharge pipe, Punaluu, Oahu, HI	0.59	--
17	213425157531701	Punaluu Stream at altitude 10 feet, Oahu, HI	16.5	--
18	213434157531001	Punaluu Stream at altitude 5 feet, Oahu, HI	17.2	+0.7 (17.2 – 16.5)

[a]Channel gain or loss between stream locations excludes measured tributary inflows to the stream.
[b]Reported loss in Punaluu Stream between sites 0.5 and 3 represents a minimum loss because two potential right-bank tributary inflows, one about 300 feet downstream and another about 1,500 feet downstream from USGS gaging station 16303000, were not measured.
[c]Reported loss in Punaluu Stream between sites 12 and 13 represents a minimum loss because of unmeasured left-bank inflow between the sites.

Punaluu Stream seepage investigation of August 4, 2005.
[cfs, cubic feet per second]

A series of discharge measurements were made on August 4, 2005, on Punaluu Stream, Oahu, Hawaii, to study channel gains and losses. The reach extends from a channel altitude of about 5 feet above mean sea level to about 100 feet above mean sea level. The discharge measurements were made during a period of near constant base flow in the stream; during the 7-day period prior to the seepage run, about 0.34 inches of rain fell at a nearby National Weather Service rain gage.

Site no.	USGS site ID	Station name	Discharge, in cfs	[a]Channel gain or loss, in cfs
0.5	16303000	Punaluu Stream near Punaluu	10	
6	213344157535301	Punaluu Stream at altitude 100 feet, Oahu, HI	9.56	-0.44 (9.56 – 10)[b]
7	213346157535501	Trib to Punaluu Stream near alt 95 feet, Oahu, HI	0.014	
8	213348157534901	Trib to Punaluu Stream near alt 75 feet, Oahu, HI	0	
9	213352157534601	Trib to Punaluu Stream near alt 70 feet, Oahu, HI	0.035	
10	213355157534701	Trib to Punaluu Stream near alt 65 feet, Oahu, HI	0	
11	213356157534701	Trib to Punaluu Stream near alt 60 feet, Oahu, HI	0.24	
12	213356157534601	Punaluu Stream at altitude 60 feet, Oahu, HI	10.2	+0.35 (10.2 – 0.24 – 0.035 – 0.014 – 9.56)
13	213402157533701	Punaluu Stream at altitude 35 feet, Oahu, HI	10.3	+0.1 (10.3 – 10.2)[c]
14	213405157533801	Ditch return flow to Punaluu Stream, Oahu, HI	1.62	
14a	213409157533901	Punaluu Stream at altitude 25 feet, Oahu, HI	11.9	-0.02 (11.9 – 1.62 – 10.3)
14b	213415157533401	Trib to Punaluu Stream at altitude 20 ft, Oahu, HI	0	
15	213413157533101	Lower taro discharge pipe, Punaluu, Oahu, HI	2-3	
16	213413157532801	Upper taro discharge pipe, Punaluu, Oahu, HI	0.74	
16a	213416157532401	Tributary to Punaluu Stream at alt 15 ft, Oahu, HI	0	
17	213425157531701	Punaluu Stream at altitude 10 feet, Oahu, HI	15.3	+0.66 to -0.34
18	213434157531001	Punaluu Stream at altitude 5 feet, Oahu, HI	16.3	+1.0 (16.3 – 15.3)

[a]Channel gain or loss between stream locations excludes measured tributary inflows to the stream.
[b]Reported loss in Punaluu Stream between sites 0.5 and 6 represents a minimum because several potential tributary inflows between the two sites were not measured.
[c]Reported gain in Punaluu Stream between sites 12 and 13 may be from unmeasured left-bank inflow between the sites.